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PAPER MAKING MACHINE

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2 Claims. (Cl. 92-44)

This invention relates to paper making machines, and relates more particularly to the removal of water from the aqueous solution carried by the screen or Fourdrinier wire during the process of forming a paper web.

The main object and feature of the invention is the production of means whereby the water of the aqueous solution will be more rapidly and yet withal more gently removed than has heretofore been possible.

In the accompanying drawing the invention is disclosed in several concrete and preferred forms in which:

Fig. 1 is a more or less diagrammatic view of so much of a Fourdrinier machine as is necessary to an understanding of the invention;

Fig. 2 is an enlarged detail view of a portion of Fig. 1 showing the improved supporting elements for the screen;

Fig. 3 is a detail view in side elevation showing one form of supporting element that may be used in carrying out the invention;

Figs. 4 and 5 are views similar to Fig. 3 showing other forms of supporting elements that can be employed in carrying out the invention;

Fig. 4^a is a transverse sectional view substantially on the plane of line 4^a-4^a of Fig. 4;

Fig. 5^a is a transverse sectional view substantially on the plane of line 5^a-5^a of Fig. 5; and

Fig. 6 is a transverse sectional view of still another form of supporting element.

As indicated in Fig. 1, A is an element that feeds an aqueous solution containing cellulose fibres to the upper run of a fine-mesh screen B that travels in the direction of arrow C. Any suitable means, such as lower couch roll D may be utilized to drive the screen. F indicates deckle straps which may or may not be employed. 3 designates a series of rotatable rollers that have the double function of supporting the upper run of the screen and of removing water from the aqueous solution. In the art of paper making, as heretofore practiced, rollers 3 have been smooth-face in consequence of which but a slight amount of water is removed by each roller or supporting element. For this reason it has been customary to employ one or more suction boxes such as E which draw a considerable amount of water from the aqueous solution. The suction exerted by E is relatively great and, in consequence of this, considerable friction is developed between the traveling screen and the top of the suction box, the result of which is that the screen wears out relatively quickly and has to be replaced, an expensive operation, because

it involves not merely the cost of a new screen and the labor attendant upon the replacement but also the loss of production of paper while the machine is idle. Furthermore, it is customary to impart a vibrating motion to the screen adjacent intake point A in order that the fibres in the solution may not arrange themselves too uniformly in the direction of the flow of said solution, and for this reason the suction boxes cannot be located near said intake end but must be arranged near the output end of the screen. It will therefore be understood that it is highly desirable to remove water more rapidly from the aqueous solution than it is now possible to do with the smooth-faced rollers so as to avoid the use or reduce the number of suction boxes or at least to minimize the amount of suction exerted by said boxes, for to do this would prolong the life of the screen, would speed up the production of the machine, and would eliminate or at least reduce the necessity for the expensive machinery that creates the vacuum or suction.

The invention consists in providing in the supporting surface of one or more rollers 3 shallow cavities such that capillary attraction will be set up between the traveling screen and the bottom and other walls of the cavities whereby a larger amount of water will be removed by such rollers than heretofore. Such cavities may take many forms, as will be hereinafter explained, and should be of such area that, without substantially diminishing the screen supporting function of the roller, the rotation of said roller causes the water to be discharged from said cavities. In this way the water will be removed more rapidly and yet more gently from the solution than when a powerful suction is employed. It is, however, not intended under all circumstances to necessarily exclude the use of suction boxes, but if such be used the suction can be materially reduced.

The word "cavity" is here used in a very broad sense as will be seen from the following. In Fig. 3 is shown one of the rollers in which the cavities consist of oppositely extending spiral grooves or canals J. The depth of these canals or cavities will obviously vary with the amount of water it is necessary to remove. Near the intake end of the screen, a depth of from say .008 to .006 inches is suitable, while the depth of the grooves of these rollers that are nearer the output end of the screen could be say .003 inches. The width of the grooves could be say one-half inch. It will be apparent that the grooves need not be helical as shown in Fig. 3, but could be straight circumfer-